Midterm 1–February 24

Open book section (36 points)

The exam is to be turned in at 1:50 pm. The closed book section should be turned in before you open your books and notes to work the open book section. For the open book section, write your answers on separate pieces of paper.

You are logged into `napoleon`, your current directory is `/4.2/usr/src`, and you run a C program containing the system call:

```
fd = open("unc/sleepy", O_RDONLY);
```

where `fd` is declared to be an integer variable. (The third argument to `open` is required only when a file is being created.) The following facts hold about the `napoleon` file system.

- Directory `/` is protected 0755. Its inode number is 2.
- Directory `/4.2` is protected 0755. Its inode number is 2129.
- Directory `/4.2/usr` is protected 0555. Its inode number is 2131.
- Directory `/4.2/usr/src` is protected 0755. Its inode number is 2.
- Directory `/4.2/usr/src/unc` is protected 0755. Its inode number is 2.
- Directory `/4.2/usr/src/unc/sleepy` is protected 0755. Its inode number is 14579.
- Device `/dev/dsk/c24d0s0` is mounted on directory `/`.
- Device `/dev/dsk/c24d2s2` is mounted on directory `/4.2/usr/src`.
- Device `/dev/dsk/c24d2s3` is mounted on directory `/4.2/usr/src/unc`.

Assuming that the directory `/4.2/usr/src/unc/sleepy` has not been accessed in a very long time, describe the steps the operating system takes in executing the `open` system call. You don't need to draw detailed pictures but show how the major data structures of the operating system kernel are changed. Also, mention how reference and link counts are changed. Occassionally, you will need to make assumptions about things such as file systems numbers, or presence of blocks in buffer cache. Go ahead and make them, just be sure to state them clearly.